WATERPROOF, DAMP-PROOF AND LONG LIFE ELETRET DIAPHRAGM

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Abstract not available for **CN 2061748 (U)**

Specification

WATERPROOF, MOISTURE-PROOF, DURABLE ELECTRET DIAPHRAGM

The present utility model relates to an electret diaphragm for acoustic-electric conversion element, on which a layer of insulating medium film is fabricated.

An electret diaphragm is a type of metallized paper having a diameter of about 5 millimeters, that is, a macromolecular diaphragm plated with a layer of metallic film whose has a thickness not greater than several ten millimeters. A metallic loop or sheep is adhered, by means of conductive adhesive, to the side plated with metallic film, in order to enhance strength and to serve as an electrode.

Currently, the industrial production of electret diaphragms is implemented through an electric corona process, and surface electron negative charges are injected. The stored charges will be discharged due to contact with mediums like water or vapor, so that electron charges are attenuated, leading to a shortened life of elements. In an even worse case, the elements cannot be used in any geographical region having a relative high humidity.

An object of the present invention is to, without any attenuation of surface stored charges, fabricate a layer of insulting medium film on them, so that the stored charges are isolated from any conductor-like substance, such as water or vapor, to avoid occurrence of discharge and extend the lift of the electret.

It is known that the surface stored charges on the electret diaphragm are vulnerable to conductor-like substance, such as water or vapor. Thus, during the fabrication of a blocking layer of insulting medium film, the electret diaphragm must be kept away from contact with any conductor-like substance. Otherwise, a signification part of the stored charges will be lost. Under the requirement of non-contact with any conductor-like substance during the fabrication of the insulting medium film, the best candidate method is "Cold Plasma Flowing Afterglow" method, because the method can satisfy the requirement.

Plasmas generated by discharging of low-air-pressure glow are called cold plasmas, which have a thermodynamic equilibrium temperature just a little higher than room temperature. The discharging area of plasmas is also a glow region and is conductive. The substance composition within the glow region is highly complex, including atoms, molecules, electrons, positive and negative ions, photons, excited particles, free radical particles, etc. Positive and negative charges will be compounded rapidly at a position nearby or about 10 mm away from the glow region. Then, the remaining active particles include only free radical particles, which are non-conductive but can form a thin film through a process of free radical

polymerization. At this moment, the non-conductive non-glow region is called "Cold Plasma Flowing Afterglow Region", and the polymerization is called "plasma induced polymerization". Accordingly, the electret diaphragm to be processed is at least 10 mm away from the glow region.

It is known that almost all organic monomers, such as ethylene, cinnamene, organic silicon, tetrafluoroethylene, siloxanes, can be formed into a film through the process of plasma induced polymerization. Some inorganic substances, such as CS_2, can also be formed into a film through the process of plasma induced polymerization. Because the latter case can not be obtained in any other way, this fact provides an opportunity to select monomers as material.

The film polymerized by monomers containing fluorin, such as tetrafluoroethylene, is good at not only insulating capability but also water resistance, that is, non-absorptive to water molecules.

The film formed by the process of plasma induced polymerization has further advantages. For example, the formed film is an inter-joint thin film of thickness 50-5000 angstroms, which is firmly adhered to the surface of the base material and compact without any needle hole. Such film is the idea water-resistant blocking layer of electret diaphragm.

Thanks to the thinness of the diaphragm, the original dynamic, mechanic and useful electrical properties of the electret diaphragm will not be affected.

By means of high frequency inductance external discharge, the plasma glow region is limited to a glass tube within a coil. Such arrangement is advantageous in that no pollution will be caused to the electrode material, and thus the formed diaphragm or film has a high performance in insulation.

The flowing afterglow region has a temperature almost equal to the room temperature, because of glow discharge. Therefore, the support tray for the electret diaphragm can be metal, ceramic or plastic. The support tray can be driven by a motor to rotate slowly so that the electret diaphragm can be formed uniformly and evenly. There is no need for the electret diaphragm to be cooled in water.

The present utility model can extend significantly the life of the electret diaphragm, because only a layer of insulting medium film for isolating the electret diaphragm from, for example, moisture or vapor, needs to be fabricated on the electret diaphragm. Meanwhile, because the electret diaphragm to be processed is disposed in the flowing afterglow region, the originally stored charges will not decrease during the process of fabricating the insulating film.

If the polymerization and film formation are to be accelerated at the price of

sacrificing some of the stored surface charges, the electret diaphragm can be disposed in a discharge glow region to be processed. In this case, the polymerization of monomers will be accelerated dramatically on the surface of the diaphragm, because there are the largest number and density of active free radical particles in the discharge glow region, and this is one of important factors for polymerization. In addition, other active particles may kind of catalyze the process of polymerization. Thus, it is possible to envisage an accelerated process of polymerization. The process of polymerization in the discharge glow region is called plasma polymerization. When there are a larger number and density of stored charged on the electret diaphragm, the plasma polymerization is applicable to process the electret diaphragm in order to speed up the fabrication, even with loss of some charges.

Only a small amount of electrical energy is consumed by glow discharge. The thin film of a thickness 50-5000 angstroms also requires only a small amount of raw material. Besides, the raw material is a kind of commonly-used material of a lower price. Therefore, the production cost is low. The glow discharge belongs to galvanization, and thus causes no pollution to environment. The process of polymerization has a less strict requirement for vacuum degree, and thus a mechanic pump suffices, leading to a low cost of equipment without diffusion pump and condensation trap.

Next, the present invention will be detailed with reference to the figures. Fig. 1 is an exaggerated schematic diagram of structure of an electret diaphragm, whose actual diameter is about 5 mm. In the figure, reference number 1 denotes an insulting medium film generated by using the flowing afterglow, which film has a thickness of 50-5000 angstroms. No sectional diagram is given in the figure. Reference number 2 denotes a macromolecular film, into the upper surface of which stored charges are injected. Reference number 3 denotes a metal film, and reference number 4 denotes a metal loop.

Fig. 2 is a schematic diagram of an apparatus for processing an electret diaphragm, in which reference number 1 denotes a barometer, reference number 2 denotes a motor, reference number 3 denotes a mechanic vacuum pump, reference number 4 denotes a support tray, reference number 5 denotes the electret diaphragm, reference number 6 denotes a clock mantle, reference number 7denotes a high frequency power supply of 100-1000 watts, reference number 8 denotes a discharge inductance coil having 5-15 windings, reference number 9 denotes a glass tube having a diameter of 20-50 mm and having the inductance coil wound thereon. Reference number 10 is a gas flowmeter, reference number 11 is a needle valve, reference number 12 is a gaseous monomer source. If monomers are liquid, they need to be heated and transformed into gas. Operating parameters are pressure 0.05-50 torrs, gas flow 1-150cc per minute in a standard condition, and processing time 0.5-20 minutes.

Abstract

An electret diaphragm having negative charges stored on its surface is a type of acoustic-electric conversion element, and the charges will be discharged when contacting with substances like water, vapor, etc. By using flowing afterflow, a layer of insulating medium film is formed on the surface of the electret diaphragm to isolate the charges from water, vapor and the like, without any loss of the original charges. In this way, the electret diaphragm is water and moisture resistant and has a longer life. Further, because the film is characterized in that it is thin, inter-joint, firmly adhered, compact and has no needle hole, the film will not impose any effect on the performance of the diaphragm.

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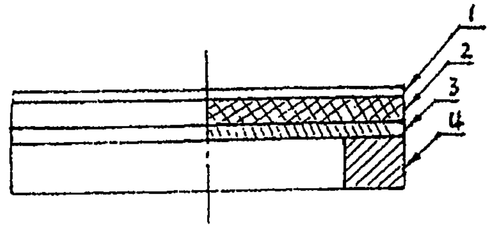
[54]实用新型名称 防水、防潮、长寿命驻极体膜片

[57]摘要

表面储存有负电荷的驻极体膜片是一种声—电转换元件。电荷与水、水汽等物质接触而放电。在原电荷不减的情况下，我们用流动余辉在上面作层绝缘介质膜，以便把电荷与水汽等隔开，这样就能防水、防潮、延长驻极体膜片寿命。另外由于膜薄，交联，粘接性好，致密和无针孔等特性，因此除防水性好外并不影响原膜片性能。



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权 利 要 求 书

一种驻极体膜片，它包括镀有一层金属的高分子膜，以及作增加强度和电极用的金属环，高分子膜面上储存有负电荷，本实用新型的特征是在驻极体膜片上制作一层绝缘介质膜。

说　　明　　书

防水、防潮、长寿命驻极体膜片

本实用新型涉及的是声－电转换元件驻极体膜片，并在它上面制作一层绝缘介质薄膜。

驻极体膜片是一种直径约5毫米的金属化纸。即在高分子膜面上镀有一层金属膜，它们的厚度均不超过几拾微米。在金属面一侧用导电胶粘贴有一个金属环或金属片以增加强度和作电极用。

目前驻极体膜片的工业生产是采用电晕处理方法完成的，注入的是表面电子负电荷。此储存电荷由于与水或水汽等介质接触而放电，使电子电荷衰减，因而元件寿命缩短，甚至在潮湿地区不能使用。

本发明的目的是在表面储存电荷不衰减的环境下同时在其上面制作一层绝缘介质薄膜，以便使储存电荷与水或水汽等类导体隔开，从而消除放电，延长了驻极体寿命。

我们知道驻极体膜片上的表面储存电荷是怕水或水汽等类导体的。因而在制作绝缘介质膜阻挡层时，驻极体膜片不能与类导体物质接触，否则此时储存电荷就会跑掉不少。为了做到在制作绝缘介质膜时，而又不接触导体类物质，则“冷等离子体流动余辉”法是最佳候选人。它能同时满足这两个要求。

低气压辉光放电产生的等离子体称为冷等离子体，其热力学平衡温度比室温高不了多少。等离子体放电区又是辉光区，它是导电的。辉光区内物质组份非常复杂，有原子，分子，电子，正负离子，光子，激发态粒子，自由基粒子等组成。在离辉光区不远，约１０毫米，正负电荷就迅速复合掉了。此时的活性粒子则只剩下自由基了，但它是不导电的，然而却可进行自由基聚合而成薄膜。此时的不导电非辉光区称为“冷等离子体流动余辉区”，其聚合则称为“等离子体诱导聚合”。因此待处理的驻极体膜片应至少远离辉光区１０毫米。

我们知道几乎所有的有机物单体，如乙烯，苯乙烯，有机硅，四氟乙烯，硅氧烷等都能进行等离子体诱导聚合而成膜。一些无机物，如二硫化碳等也能等离子体聚合而成膜，后者用其它方法是不可能得

到的。这就给我们提供了选择材料单体的机会。

含氟单体如四氟乙烯等聚合成的薄膜，不仅绝缘性能好，而且排水性也很强，即不吸附水分子。

等离子体诱导聚合生成的膜还有其它优点。生成的是交联状薄膜，５０－５０００埃。膜与基材表面粘接牢固，薄膜致密而无针孔。这是理想的驻极体膜片防水阻挡层。

由于膜薄，因此不会影响原有的驻极体膜片力学，机械及有用的电性能。

我们采用高频电感外部放电，等离子体辉光区就限制在线圈内玻璃管中。此种装置的好处不会带来电极材料的污染，因而生成的膜绝缘性能好。

由于是辉光放电，其流动余辉区的温度则几乎与室温相等。因此驻极体膜片的支撑盘可以是金属，陶瓷或塑料。支撑盘可由马达带动作慢速转动，以便成膜均匀。驻极体膜片无需用水冷却。

本实用新型因为只需要在原驻极体膜片上制作一层绝缘介质膜把水汽等隔开，因而可大大提高其寿命。同时由于待处理的驻极体膜片放置在流动余辉区中，因而在制作绝缘膜时，其原有的储存电荷不会减少。

若我们愿牺牲一些储存的表面电荷，以换取聚合成膜速度的提高，则我们可把驻极体膜片安置在放电辉光区中进行处理，这时单体在膜面上的聚合速度会大大加快。因为在放电辉光区中，自由基活性粒子是最多和最密的，这是聚合的重要因素，另外其它活性粒子对聚合也有一定催化作用，因此聚合速度加快是可以想见得到的。在放电辉光区中的聚合称为等离子体聚合。因此在驻极体膜片上储存电荷较多较密时，为了提高生产速度，不惜跑掉一些电荷，采用等离子体聚合处理膜片也是适宜的。

辉光放电所耗电能是不多的。由于膜薄，５０－５０００埃，因此所需原材料少。加之原材料又属一般通用材料，价格便宜，因此生产成本不会高是可以想见到的。辉光放电属干法镀，因此对环境几乎没有污染。由于聚合所需真空度不高，仅机械泵就够了，无需扩散泵和冷凝阱

因此设备价格不会高。

下面将结合附图分别对发明作出详细描述。图1是驻极体膜片结构放大示意图。实际上直径仅约5毫米。其中1是用流动余辉所生成的绝缘介质膜。厚度为50－5000埃，图中未画剖面。2是高分子膜，上表面注有储存电荷，3是金属膜，4是金属环。

图2是驻极体膜片处理装置示意图。其中1是气压计，2是马达，3是机械真空泵，4是支撑盘，5是驻极体膜片，6是钟罩，7是高频电源，100－1000瓦，8是放电电感线圈，5－15匝，9是玻璃管，直径20－50毫米，上绕电感线圈，10是气体流量计，11是针阀，12是气态单体源。若单体为液体时，则需加热把它变为气体。运行参数如下：压力0·05－50托。气体流量在标准条件下为1－150CC／分；处理时间为0·5－20分钟。

说 明 书 附 图

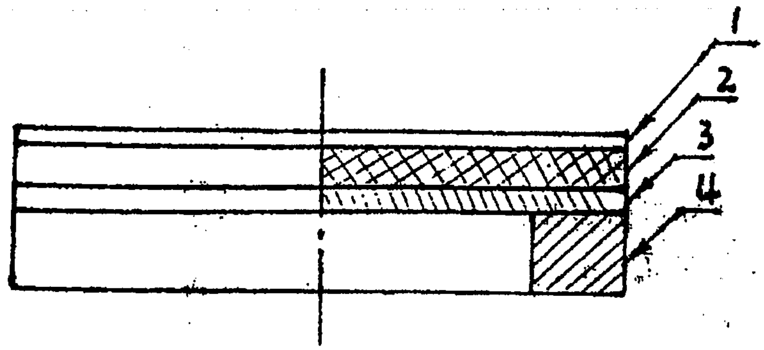

图 1

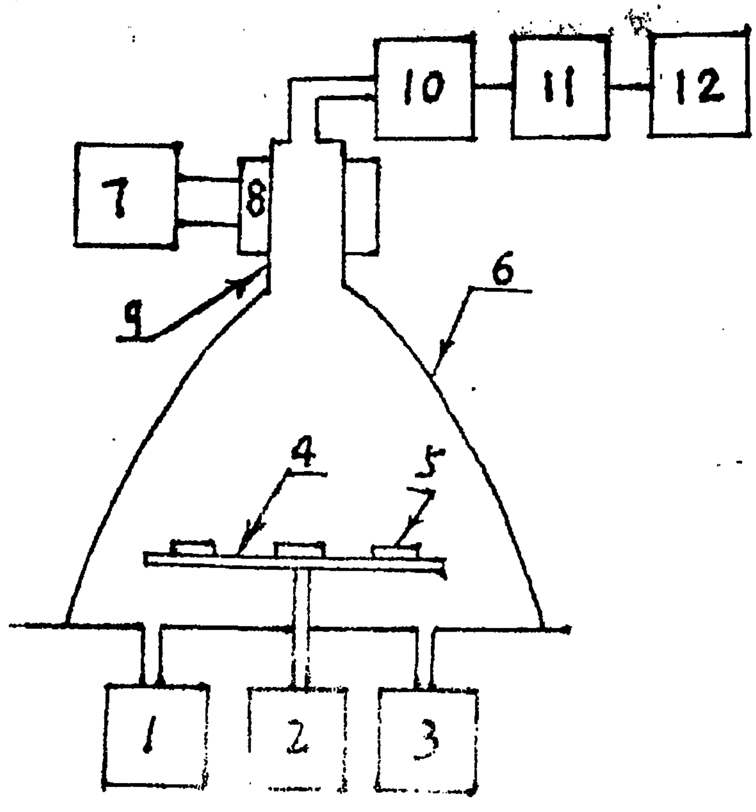

图 2